



INTEROFFICE MEMORANDUM

DATE December 30, 1964

SUBJECT Annual Physical Examination

TO Ken Olsen

FROM Win Hindle

We feel quite strongly that those in critical positions at DEC should have an annual physical examination at Company expense. If you have not had a physical exam in 1964, please schedule one soon and have the bill sent to me.

A handwritten signature in blue ink, appearing to read 'Win'.

WRH:ecc



INTEROFFICE MEMORANDUM

DATE December 29, 1964

SUBJECT NEW SECURITY PROCEDURES

TO All Supervisors

FROM Loren Prentice

Effective January 4, 1965 the following new security regulations will be in effect:

1. All material and equipment removed from Digital premisses: This must be done by filling out pertinent data in the sign out log and in the sign in log when the material is returned. The log sheets are made out on a one day basis initialed by the guards and/or the receptionist and returned to Judy French. She will collate the sign out log with the sign in log and those persons who have not returned their equipment will be so notified. After three notifications, a fourth notification will be sent to their supervisor. This will be done on a company form and this office will keep track of the material sign in and sign out log together with the notification as outlined above. This memo voids all old rules on stenorettes, typewriters or any lists of people who have been permitted to take out equipment in the past, primarily the field service personnel.

2. Authorization of visitors into the plant: Employee's families, boy scouts, girl scouts, cub scouts, little league baseball groups or others, will continue to be authorized by Bob Lassen's office. Customers, business persons necessary for after hours entry into the premisses, can be authorized by persons designated by the department managers. This list has been submitted to the security committee and those persons who have been approved for such authorization, have been notified.

3. Security violations: In the past, Judy French has notified people by telephone, of security violations from the reports passed in by the Pinkerton Guards. This practice will be discontinued and a form will be sent to all supervisors notifying them of security violations in their area. This notification form will be delivered to your desk daily. The instances of hot irons left on, oscilloscopes and computers left running, has risen at an alarming rate and the security committee feels that, only through the supervisors taking personal interest and carrying this on to their people, can these violations be reduced.

4. Missing equipment: Items for which people are signed out for and held accountable such as test equipment signed out from test equipment headquarters, tools signed out on permanent loans from the tool crib, will be reviewed periodically. The equipment which cannot be accounted for, which is deemed lost or missing, the person who last had it signed out to him will receive a form to be filled out and returned to the security office. These in turn will be reviewed by the security committee. If the committee feels that an insufficient cause for lost equipment is given or repetition by an individual occurs, the person will be called before the security committee to explain the cause or reason for the missing equipment.

It must be the responsibility of the respective supervisors to make the people in their particular section aware of these new security procedures as no other memo will be issued. The receptionists and the Pinkerton Guards have been notified of the new procedures and these are in effect January 4th as noted in the memo.

Loren B. Prentice
Plant Security

*LIST OF Personnell to
author's vessel after hours
as requested by Dept Resale* *Ken Olsen*
RBD

JACK ATWOOD:

Jack Atwood
Stuart Grover
Ralph Wooldridge
James Lozowski
George Lord
Robert Graham
Alex Stephens
Joseph Nangle
Warren Marshall

JOHN CULKINS:

J. Culkins

JOHN FADIMAN:

J. Fadiman
Brad Towle

GEORGE GERELDS:

G. Gerelds

BOB BECKMAN:

Bob Beckman
Stefan Mikulski
Robert Pate

ED HARWOOD:

E. Harwood
R. Mangsen
Vito Augello

GORDON BELL:

Gordon Bell
L. Portner
R. Savell

BOB HUGHES:

R. Hughes
J. Cudmore
K. Doering

DICK BEST:

Dick Best
J. Hastings
D. White
A. Hall
A. Kotok
R. Wilson
J. McKalip
R. Tringale
D. Chin
L. Hantman
T. Strollo
L. White

TED JOHNSON:

T. Johnson
J. Shields
P. Gadaire

BOB LASSEN:

B. Lassen

D. MILLS:

D. Mills

HENRY CROUSE:

Henry Crouse
B. Farnahm
R. King
D. Kuyamjian
P. McGaunn

STAN OLSEN:

S. Olsen
N. Mazzaresse
R. Lane
J. Ridgeway
J. Jones
J. Burley
R. Belden
D. Cotton
M. Ruderman

PAT GREENE:

P. Greene
J. McKeen
L. Butterworth

LOREN PRENTICE:

L. Prentice
D. Richardson

ROGER MELANSON:

Roger Melanson

MAYNARD SANDLER:

M. Sandler
C. Kendrick

JACK SMITH:

J. Smith

K. H. Olsen



INTEROFFICE MEMORANDUM

DATE December 28, 1964

SUBJECT The 168 Processor, Alias PDP-6A

TO K. H. Olsen
H. Anderson
R. L. Best
G. Bell
R. Doane
L. Seligman

FROM A. Kotok

The primary purpose of this project is to keep DEC in the Medium to Large computer field for the next few years, with the minimum possible expense. To accomplish this goal, several sub-goals become evident:

- I. Reduced production cost
 - A. Use of Flip-Chip modules
 - B. Automatic back panel wiring
 - C. Simplified checkout through
 1. More accurate wiring
 2. Elimination of rear busses on modules
- II. Increased Marketability
 - A. Lower selling price for minimum system by making floating point optional
 - B. Availability of double precision floating point as an option
 - C. Faster processor speeds by
 1. Inclusion of Fast Memory (still optional) in processor instead of on memory bus
 2. Use of DC adders in arithmetic unit (Factor of 3 gain on X, \div)
- III. Program and Electrical Compatibility
 - A. All existing 166 programs will run on the 168 (except that floating point may need interpretation)
 - B. Should not obsolete existing systems in the field
 - C. Only new programming necessary are maintenance routines
 - D. New processor can plug into old systems

The schedule for this project calls for the machine to be turned over to production in one year from the start of full time work. This can only be accomplished if a "task-force" is established whose primary (and hopefully sole) responsibility is to this project. Initially this group must consist of 2 logic designers, 1 full time circuit designer, and a competent technician. As shown in the schedule, this force should expand as time progresses.

Our experience with the first PDP-6 shows that at high speeds, circuits and logic cannot be designed independently. Therefore it is absolutely necessary that a circuit designer be part of the team. The circuit man must appreciate how his circuits are being interconnected, just as the logic designers must appreciate the limits of the circuits.

It has been stated in previous memoranda that this project should wait for some form of automated drafting. Although I have implicit faith in such things, I see no evidence that a workable system will be available in the near future. As a side issue, I would like to put whatever weight I may have (which is much more literally than figuratively) behind the development of such a system for our next computer design effort.

AK/mro

Tentative 168 Schedule

11/20/64

	LOGIC	CKTS	PROG	Tech	Draft	
DEC	1	1/2		1/2		
JAN	2	1/2		1	2	↑ T
FEB	2	1		1	3	↓
MAR	2	1		1	3	
APR	3	1		2	3	
MAY	3	1	1/2	2	3	
JUN	3	1	1/2	2	3	↑ W.L.
JUL	3	1	1	2	3	↓
AUG	3	1	1	3	3	↑ JULY
SEP	3	1	1	3	3	↑ CKout
OCT	3	1	1	3	3	↓ Prod
NOV	3	1	1	3	3	↓
DEC						

T = Think time
D = Drawings

WL = Wire List



INTEROFFICE
MEMORANDUM

DATE December 28, 1964

SUBJECT Used Type 30 Displays

TO Ken Olsen ✓
Nick Mazzaresse
Mike Ford

FROM George Rice

Prof. Jack Dennis called and said he could put to good use a Type 30 Display. He doesn't have too much spare cash so he is unable to obtain a new display. His specific interest is to see if we would or know of anyone who wants to sell a used Type 30 at a discounted price.

I told him I didn't know of any Type 30's available but would inquire around.

George Rice

digital MEMO

DATE 12/23/64

TO Ken Olsen FROM Don Watson

As you probably know, the PDP-8 was selected as one of the top ten products at the ISA Show. A Mr. Starn of ISA called me and wants to present you, or another official, with an award.

11-12:00 Their Director of Society Operations, Herbert Kindler, would like to come to Maynard on Friday, January 29, and make the presentation, if this date is OK with us.

I will arrange to have pictures taken of the award presentation for use in ON LINE and perhaps send a news release about it to the local and Boston papers.

Would you let me know if the above date is OK and who will receive the award, and I will let the ISA people know. Thank you.

Don Watson

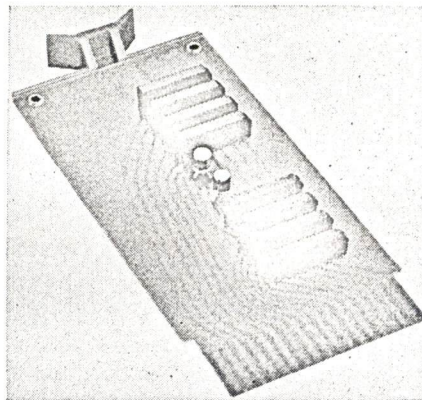
Top show products

These ten products were chosen by the editors of the *ISA Journal* as outstanding examples of the innovation demonstrated by many products displayed at the 19th Annual ISA Conference and Exhibit in New York.

Data processing computer

The low price of this general-purpose computer results from the use of integrated circuits such as those as shown in the photograph. Programming systems that have been in use in the field more than a year, and FORTRAN are available with the computer, the PDP-8. It is the third of four computers introduced within a year, and is intended for high-speed data handling and processing in the computation centers, laboratories, and process control systems. All processing circuits use silicon semiconductors, many of which are in Digital's 10-mega-cycle FLIP CHIP® integrated circuit modules. Wiring of the central processor is done with a Gardner-Denver Wire Wrap machine under automatic control.

The PDP-8 will sell for \$18,000 for 4096 words of 12-bit core memory. It has a 1.6-microsecond memory cycle, adds in 3.2 microseconds, and transfers data at rates up to 625,000 words per second. The basic system will be a console teleprinter with 10 character-per-second paper tape reader and punch, and complete software package, including FORTRAN, macro assembler, and on-line debugger.



Programming includes symbolic editing, standard FORTRAN libraries, input/output programs, single and multiple precision and fixed and floating point arithmetic routines, and utility and maintenance routines.

The computers can perform data and program interrupts, indirect addressing, and multiple indexing. It uses the ASCII 8-level Teletype code, and can service up to 192 devices on its input/output bus. For process control using 100 channels additional equipment would cost approximately \$1,000 for A/D conversion, plus \$100 per channel. Digital Equipment Corp. Circle No. 301 on Reader Service Card.

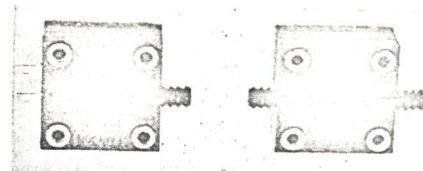
transmitter circuits. This is done by turning the appropriate screw-driver slots to a vertical position as shown in picture. Setting the zero point is done by turning the slotted pin at bottom center. This adjustment is accessible without removing the cover plate.

The compact volume, 150 cubic inches, and weight, 20 pounds, of the design were possible, in part, because fewer parts are used in building the new transmitter. Accuracy is a reliable 0.5 per cent.

Besides smallness, other advantages of the unit result from the use of: isolating diaphragms, force-balance measuring, a statistically balanced single lever system, electrical span adjustment, and elimination of force transmission through the pressure housing. General Electric. Circle No. 302 on Reader Service Card.

Pressure switch

Most pressure sensors which can resist vibration have stiff rigidly-mounted contacts. Such construction decreases sensitivity and increases size, weight, and cost. This switch has contacts which move readily, however the two contact arms must move toward one another; that is, in opposite directions, for the switch



to close. Since shock, acceleration, and vibration loads cause both arms to swing in the same direction at any given time, the switch is insensitive to these loads. It can be mounted in any attitude.

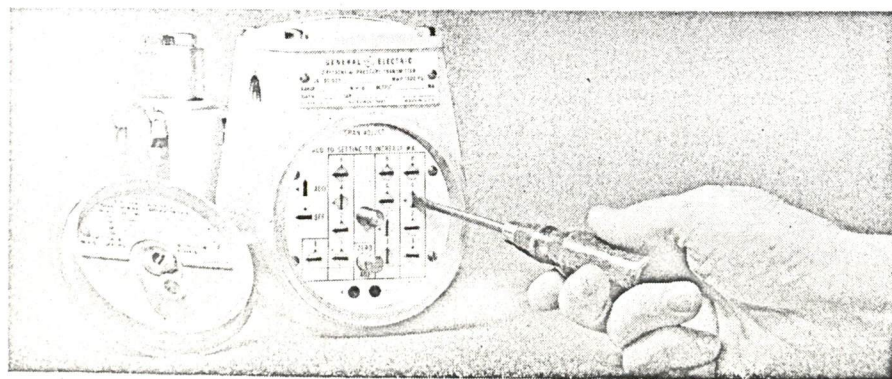
The PSF100, which can detect pressures of less than 1/2" of water, functions as a switch, fuse or detecting element. Despite its sensitivity it is virtually insensitive to shock, vibration, acceleration or any other mechanical and physical environmental conditions. The combination of sensitivity and ruggedness make this low-cost device useful for a wide range of applications. For example, in addition to measuring pressure, differential pressure, or vacuum, the PSF can be used for production counting by sensing

Differential pressure transmitter

The compact and light weight Type 555 D/P transmitter is completely sealed, and shock and vibration immune. In addition to a repeatability of 0.1 per cent and a

signal option of 4-20, or 10-50 ma, the transmitter has a span adjustment which is digitally set.

Span setting is made by switching discrete resistances into the





INTEROFFICE MEMORANDUM

DATE December 21, 1964

SUBJECT

TO K. Olsen
S. C. Olsen
H. E. Anderson

FROM D. J. Doyle

This is to keep you somewhat in the picture as to our hardware operations up here, and to make a few general comments on our operations. I hope to have a chance to discuss them in more detail by getting down to Maynard within the next few weeks.

Manufacturing

We are presently doing a system for Westinghouse which we quoted at \$22,750. It is for use in a satellite control system which is using an SDS910 as the mainframe. Westinghouse had actually wanted SDS to do it, but the Canadian Department of Transport passed on some pressure in our favour and SDS showed little enthusiasm after the computer sale. We are doing everything we can for Westinghouse as they are bidding on five more stations (SDS does not know this).

The present interface uses less than \$8,000 worth of flip-chips, and I can see that work of this type is a good money maker if we have the ability to do it. I am confident of our ability.

Manpower

For this contract we have taken on two wiremen, and I think we will keep them from now on. I would very much appreciate some guidance on the subject. Unless I get strong support for manufacturing part of our standard line up here, I will not actively go after it. My approach is that I would not commit DEC to a manufacturing operation that I would not be prepared to undertake if I were in business for myself.

Organizational Problems

One of the recommendations that I would like to make at this time is that the Canadian subsidiary be placed under the direction of our foreign marketing group. This implies of course that our foreign marketing group will be built up to be a considerably more effective group than they presently are.



INTEROFFICE MEMORANDUM

DATE December 18, 1964

SUBJECT

TO K. Olsen
S. C. Olsen
H. E. Anderson

FROM D. J. Doyle

As you know, I presently report directly to Ted Johnson, and it is working quite well; but I think that a shift into our foreign marketing group would do everyone a lot of good. Here are a few of the factors affecting my thoughts:

1. The Canadian company has already solved many of the business problems (duties, accounting, etc.) which will be repeated in every foreign country. John Leng's stay in Canada is no doubt contributing to his present effectiveness in dealing with the English and European operations. I think that much of this experience could be more effectively shared by having a business manager in our foreign group at Maynard who maintains liaison with all foreign operations.
2. The foreign group at Maynard should be expanded to include the following:
 - a) Foreign manager
 - b) Technical co-ordinator
 - c) Business manager
 - d) Secretary

This would be a "bare bones" type of organization, but one which could be expanded.

3. Some of the improvements that I am aiming for are as follows:
 - a) More effective co-ordination of the people at Maynard who must deal with our foreign subsidiaries, e.g., personnel, advertising, sales, accounting, etc.
 - b) More aggressive sales promotion tailored to accomodate foreign politics and the technical limitations of our foreign customers.
 - c) An increase in the efficiency of each subsidiary manager by giving him a single group of experts at Maynard to rely on. At the present time, I find that I deal with too many both to get information to me and to give it



INTEROFFICE MEMORANDUM

DATE December 18, 1964

SUBJECT

TO K. Olsen
S. C. Olsen
H. E. Anderson

FROM D. J. Doyle

back to you.

For example, few people are able to realize that a foreign market requires the same effort as we had to put on to open up the U.S. market for our PDP-1 and PDP-4's a few years ago. I get terribly annoyed when I get scolded for committing myself to doing "more for a PDP-5 sale than we can afford to do for our best customer in the U.S."

A foreign marketing group would be in a better position to assess such situations. I feel that a foreign sale and thus a foreign sales office merits (and requires) about three times the effort that an equivalent U.S. sale requires.

If Canada is to compete with the U.S. sales offices for back-up, then we will find our future a difficult one. Furthermore, little support will be found for our manufacturing plans. Without this support, then I do not think that DEC will achieve its eventual share of the market up here.

We can expect strong pressure from every foreign subsidiary to do some manufacturing. Our product line makes the economics of special systems work very attractive, especially when one considers how effective it is in opening up a market. The main concern, I feel, will be the ability of each company to do it. Once again, the Canadian experience should be of some help, both from a technical and business standpoint.

Doyle



INTEROFFICE MEMORANDUM

DATE December 18, 1964

SUBJECT

TO Ken Olsen FROM Ed Harwood

For some time now we have all talked about how we should automatically test our computers. Everyone is very free with their ideas and probably some of them merit a closer look.

I have assigned two people at various times to look into this area in addition to their normal jobs. Both of these people made some progress and we have developed some testing aids, but due to a severe shortage of good people, I have had to pull them off of these jobs. In the meantime, the problem gets more acute and little is being done.

It took the better part of a year and two men full time to design, build and get the Module Tester into operation. I feel the same effort should be made for a Computer Tester.

I propose that starting January 1, 1965, one Engineer and one Technician be assigned the full time job of preparing a proposal of how we should automatically test our new line of computers, PDP-7 & 8 types.

The proposal should take approximately one month to prepare and should contain at least the following information:

1. How long to become operational.
2. How much special hardware needed.
3. How much if any programming is needed.
4. How much floor space.
5. How much will the first one cost.
6. How many will we need.
7. What caliber of person would use the tester.

I suggest the two people who might be suited to prepare the proposal and design the system would be Ted Strollo and Dave Pinkney. I further suggest that since my group has demonstrated its ability to get a job done and the work falls in the category of a special computer system, that these people report to me during the design and building of the first system.

dec

INTEROFFICE
MEMORANDUM

DATE December 18, 1964

SUBJECT SERVICE AWARDS LUNCHEON

TO ✓ Kenneth Olsen
Harlan Anderson
Stanley Olsen

FROM Jack Atwood

cc: Bob Lassen
Win Hindle

I would like to propose that the second presentation of Five Year Service Awards be at a buffet luncheon in Conference Room A on December 31.

The list of people who are eligible for awards as of December 31 is as follows:

Richard Best	Anne Gill
John Culkins	Normand Perryman
Paul Gadaire, Jr.	James Myers
George Gerelds	Melvin Arsenault
Robert Dill	Edward Harwood
Eva Anelons	Arthur Clockedile
Henry Crouse	Gertrude Loynd
Broncia Smale	Loren Prentice
Roger Melanson	Madeline Tracey
Robert Graham	Robert Borella

Ted Johnson should also be invited since he missed last year's event.

I have checked with John Tobin, and this date is quite satisfactory. The suggested menu is:

Cold roast beef
Cold turkey
Potato salad
Deviled eggs
Tomato cocktail
Rolls and butter
Milk
Coffee
Cupcakes

file

DEC INTEROFFICE MEMORANDUM

DATE December 14, 1964

SUBJECT

TO K. Olsen ✓
H. Crouse
R. Hughes
T. Stockebrand
J. Viscogliosi

FROM J. Smith

A couple of weeks back, while discussing future diode orders with Henry Crouse, I was surprised to learn that diodes could be purchased in wafer form for one third our present cost. This immediately suggested to me that we should investigate the possibility of dicing up wafers. I discussed this possibility briefly with Tom Stockebrand and he suggested I talk with Bob Hughes. After a brief cost study, which is outlined below, it would seem most economical for us to purchase diodes in wafers and do our own testing and dicing.

Present Cost

\$140/1400 - Tested diodes or .10/die

Wafer Method

Wafer Cost \$55.00
Wafer Processing, which includes testing, sorting and dicing - 24 minutes @ \$5.50/hour 2.20
Total Cost per Wafer \$57.20

Manufacturer's guaranteed yield - 1400 diodes/wafer

\$57.20 = .04/die
1400

Proposal:

Bob Hughes has offered to instruct John Viscogliosi and myself with the operation of the dicing machine. Bob also thinks he can get us some junk wafers to practice with.

We should ask Electra Gluss to send in their wafer-testing machine for evaluation. The cost of the machine is approximately \$8,000.00. It may prove more economical not to test the wafers once we have gained more experience. But a machine of this type will be required once we begin to manufacture our own diodes.

We should try to pin down the testing and dicing operations this week. We could then place our next diode order in wafer quantities.



INTEROFFICE MEMORANDUM

DATE December 14, 1964

SUBJECT Flip Chip Parts

TO

Kenneth Olsen
Maynard Sandler
Loren Prentice
Henry Crouse
Jack Smith
Tom Stockebrand
K. Doering

FROM

Dick King
Paul McGaunn
Bill Farnham

CC: Phil Backholm
Ron Cajolet

The following is the latest status report of components and equipment on order for the Flip Chip Modules as of December 14, 1964.

Ceramic substrate

FRENCHTOWN PORCELAIN CO. - 6 pin part slotted
1100 pieces received
5000 pieces due 12/18/64
5000 pieces each week to completion
of 35,000 pieces.

AMERICAN LAVA CORP.

10/M pieces shipped 12-10-64
10/M pieces shipping 12-17-64
15/M pieces shipping 12-21-64
Balance shipping 12-23-64

Metal substrate cover - gold anodized

SYLVANIA ELECTRIC PRODUCTS INC., PARTS DIVISION
50,000 pieces due 2/12/65

Mounting panel frame

DOEHLER-JARVIS DIVISION OF NATIONAL LEAD COMPANY
sample pieces for our evaluation
due 12-28-64
5000 pieces due 1-25-65

PAGE TWO
Flip Chip Parts
December 14, 1964

144 Pin Connector Block

SYLVANIA ELECTRIC PRODUCT PARTS DIVISION

1640 pieces received (wirewrap)

Sylvania shipping at rate of 250 pieces every other day. Initial shipment of solder type block due Thursday, December 17, 1964. (300 pieces)

Sylvania will ship both solder and fork type units in increment of 250 pieces of each type as they are assembled.

Furnace

BTU ENGINEERING

Information received on December 11, 1964 indicates that DEC personnel will be able to witness acceptance test on Tuesday, December 15th and providing they are satisfactory, delivery should be on Friday, December 19, 1964. Confirmation of the above dates will be sent to affected personnel.

Dick King
Paul McGaunn
Bill Farnham



INTEROFFICE MEMORANDUM

DATE December 11, 1964

SUBJECT

LINC DEMONSTRATION IN COPENHAGEN

TO *Ken Olsen*

FROM Mort Ruderman

The LINC arrived in Copenhagen without incident. Upon my arrival I immediately proceeded to plug together all the remote units to the main frame. At this time power problems with the motor generator set were evident. The problem being that the building did not have sufficient power for the motor generator set. The motor generator eventually became operable by taking power directly from the utility lines.

The following day, Dr. Cox arrived and we proceeded immediately to determine that the LINC was operating properly. One of the instructions was not operating. We solved this problem by replacing a 1151. We then proceeded to run through some preliminary demonstrations for the next day. From this time, which was Monday afternoon, for the remainder of the week until late Saturday afternoon, the only other experience of failure that we had was marginal sense amplifier.

The first demonstration took place when some people just happened to drop in who had been doing experiments with phono-fetal electrocardiograms. We suggested that these people bring their FM tapes back and that we would process these directly for them to get a better feeling for the capability of the LINC.

The first scheduled demonstration of the many that were run during the week was held Tuesday morning where the typical demonstration ran as follows: Dr. Cox gave a bit of the philosophy of design and the history of the LINC and its development at M.I.T. and that now the LINC was commercially available. He proceeded to demonstrate the number of ways to enter the machine either through the keyboard or the toggle switches or data terminal box. Dr. Cox explained the features of the LINC tape, A to D and D to A and the relay controls. He then proceeded to demonstrate the guide utility program.

In general, this utility systems program, called, GUIDE, enables one to very easily store any programs on tape, to call for all existing programs at the keyboard, Up-Date or Modify, or do a number of different manipulations right at the keyboard with everything instantaneously displayed on the oscilloscope.

Following the discussion of these features, Dr. Cox then proceeded to demonstrate programs such as the Baslar membrane program.

The next program normally demonstrated was the Cursor Program where any data stored away on tape or in memory could be called for such as EKG or any particular analog input which would be immediately displayed on the oscilloscope and the Cursor is now available so that you can position it on any point on the curve and identify its relative amplitude.

The next program normally demonstrated was the Fourier analysis program where again we could take any information stored on tape or in memory and have it displayed on the oscilloscope. The information traverses the scope from left to right and in the left hand portion of the display scope would immediately appear a bargraph of the relative frequency distribution of the particular wave form. A number of people seemed extremely interested in this type of application where they could take EKG's or evoked potentials, store them away, and then display them on the scope and immediately get the frequency distribution of the input. Also, the scope display may be frozen so as to take a Polaroid shot.

The next program normally demonstrated was a program written by Dr. Killam at Stanford University. This particular program allows you again to take any particular wave form or data and display it immediately on the oscilloscope and by hitting individual keys on the keyboard, perform various functions, i.e., differentiation, integration, reverse polarity, smoothing, enlarge amplitude, decrease amplitude or plot a bargraph.

Then a number of other wave forms were usually displayed in this form such as fetal electrocardiograms which certainly were familiar to most people in the audience. The ability to manipulate and be able to process data in this manner seemed to be of extreme interest to individuals and always initiated a multitude of questions. Dr. Cox then proceeded to demonstrate or discuss some of the work that he was doing which was separating the fetal heartbeat from the combination of the maternal and fetal electrocardiogram. He was able to average out the maternal EKG completely so that only the fetal EKG remained. Using the memory scope that we had borrowed from Tektronik's, certain characteristics of both the fetal

and the maternal beat were displayed such as breathing effects etc.

The last actual demonstration that was usually performed during this discussion was when we took an individual and connected him to an electrocardiogram unit and then directly into an A to D channel of the analog input of the LINC, thus performing on-line processing of electrocardiograms. In this manner by hitting the numbered keys on the keyboard, a number of averaged EKG's appeared on the scope. Five letters then appeared on the oscilloscope at various positions around this EKG and these were: "R" for indicating the R wave of a typical electrocardiogram, the "P", "Q", "S", portions of the electrocardiogram. It was very interesting to see the difference between a single EKG with all the noise and an average of 16 with all the noise averaged out. Again, we could take this average EKG and store this away on the tape, call for a program such as the Fourier analysis and do a frequency analysis of the EKG that we had just obtained on-line. This seemed to be absolutely amazing to most people watching the demonstration. Following this aspect of the demonstration, Dr. Cox then indicated a number of the input-output units that various people have interfaced to date, such as IBM compatible tape, Calcomp plotters, Teletypewriters and X-Y plotters to do a variety of applications. This was a typical demonstration which normally took 1½ to 2½ hours depending upon the interest and the number of people there. Following Dr. Cox's complete demonstration, I normally spoke about the availability of the LINC and Digital Equipment Corporation and also usually discussed the PDP-8 and modules. I assured the people that we were available during the week to discuss any particular application or discuss any one of our particular machines. Following this, Jim Milton, Dr. Cox and myself worked with potential customers discussing their particular applications. Normally two demonstrations were scheduled each day, one for the morning and one for the afternoon. However, normally we usually for some reason or another had an unannounced group appear late in the afternoon and we normally went through the same type of demonstration. After running two early morning demonstrations on Friday, Dr. Cox left Friday noontime and following this, I, (after having watched Dr. Cox throughout the week) ran two demonstrations Friday afternoon and an additional two Saturday.

At various times throughout the week, we were able to discuss with Dr. Tybjaerg-Hansen, and Mr. Dessau, who were the two major individuals to be sold on any system that was to be obtained at the Rigshospitalet in Copenhagen. They were definitely committed to getting a LINC, their problem now was to get funds as soon as they possibly could.

They made, from all indications that I could see, an all-out effort to obtain the funds while we were there so that the possibility of keeping the LINC there and not having to repack it and send it back to the United States. However, since they could not exactly determine when their funds would become available - in 1 month, 2 months or 3 months or maybe even longer, it was with reluctance they determined that it probably would be best to repack and ship it back. As soon as they knew funds were going to be allocated they will notify us so that we can make the necessary arrangements to see that a 50 cycle supply and LINC tape units can be modified so that they will be operational in Europe. I promised them probably from this time we should be able to deliver a LINC in 6 months in the configuration that would be operational in Europe.

This was the World Health Organization's first meeting on data processing. People from the World Health Organization were present at various times during many demonstrations. We had two special demonstrations, however, specifically for people from the World Health Organization. This being the first demonstration, Friday morning, and the last demonstration Saturday. These people all seemed to go away extremely encouraged. DEC did extremely well. We got very good exposure. A number of people from other areas in Europe made it a point to travel to Copenhagen for the demonstration, mainly from Paris, Germany and Sweden. I had received several letters while in Copenhagen, and I have received a number since, who are extremely interested and would like to have further information and discuss the LINC, PDP-8 and Flip-Chips a bit further.

I have also circuited the News Release that SDC released on their demonstration during the same week for the World Health Organization. This was the time-sharing application between Copenhagen, and SDC and Santa Monica using the PDP-1 and the Q32. Therefore, again I say, we as a company got good exposure between time-sharing and the LINC.

Prospects from Demonstrations (Serious)

1. Dr. Tybjaerg-Hansen
Rigshospitalet, Copenhagen LINC
2. Dr. Gert Jensen
Technical High School PDP-8, Modules
3. Erling Dessau
Dataconralen, Copenhagen good potential (future) Large System
4. Mr. Bent Lassen - Modules
Dataconralen, Copenhagen
5. Dr. Jan Strackee LINC, PDP-8
Laboratory of Medical Physics
University of Amsterdam
Amsterdam, Holland
6. Dr. Oberhoffer LINC
Department of Medicine
University of Bonn
Germany
7. Dr. Paul Hall LINC (Very good prospect
Serafimer Hospital in other areas also)
Stockholm, Sweden
8. Mr. L. Monrad-Krohm LINC, PDP-8
Norwegian Defense Research
Division for Electronics
Kjeller P. O. Box 25
Kjeller, Norway
9. Dr. O. J. Grusser LINC, PDP-8
Physiologisches Institute
Der Freien Universitat
Berlin 433, West Germany
10. Prof. Dr. G. Magner Good Computer Prospect
6907 Wilhelmsfeld
Riesenberg, Germany
11. Dr. David H. Blankenhorn LINC
% A + d B
Rigshospitalet
Copenhagen, Denmark

July 1965 % USC
Dept. of Int. Medicine
2025 Zonal Avenue
L. A., California

12. Plus Return Bingo Card - to Reading, England

13. Dr. Gray Walter
Oxford University
England

LINC, PDP-8



INTEROFFICE MEMORANDUM

DATE 8 December 1964

SUBJECT FLIP CHIP connectors

TO K. Olsen

FROM D. Smith

I called John Hitch on Friday night, December 4, 1964. John has given us some additional information pertaining to the connector and some corrections to my memo of the 4th of December on the connector.

1. Page one, Item 1: The contact pressure should be a nominal of 250 grams; minimum of 190, maximum of 300 at manufacturer time. The initial force would decrease about 15% over a period of 40 years due to stress relaxation.
2. Page one, Item 2: The gold alloy should be about .0001 thick.
3. Page one, Item 3: The last word is nickel.
4. Page two, first paragraph, second sentence : It has to be great enough to plow through the impurities that are on the card and the contacts.
5. Page two, first paragraph, last sentence : Inserting a card once every two years (in the field and under other than laboratory conditions) over a period of years....
6. Page two, second paragraph, last sentence : The other end of the round connector can be made square by coining it flat and it may be serrated, if desired. (The rough edges tend to make the wire wrap a little better. The round kurrled wire wrap requires special tooling and probably we would not care to investigate this.)
7. Page two, fourth paragraph : The Carnauba wax is not a micro crystalline wax but we should be able to find a micro crystalline wax.

Following are various points concerning connectors:

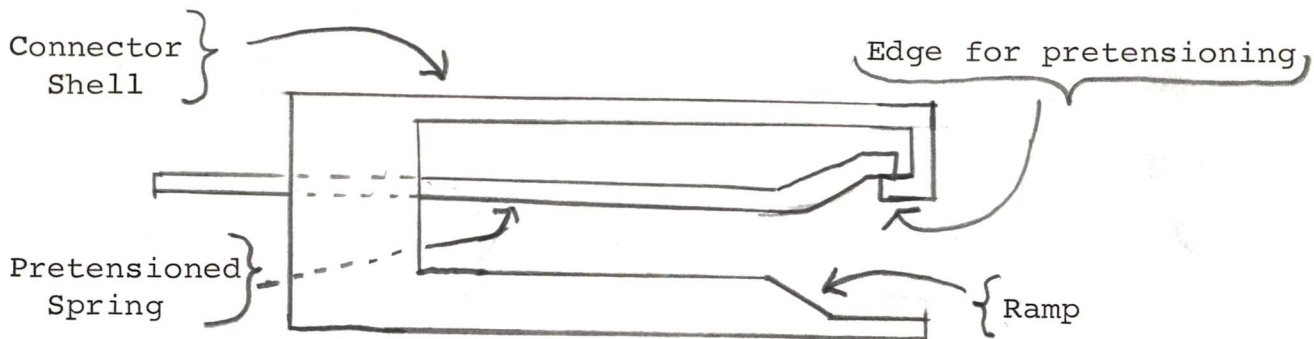
1. Spring pretensioning:

The reason for pretensioning; is that softer, more compliance springs (which result in more uniform pressure)

may be used. In about 1/16 of an inch (thickness of our boards) the spring pressure must go from \emptyset to 250. It must be a strong spring.

If the spring is pretensioned at about 195 grams there would be less tension buildup (from 195 to 250 grams). Pretensioning also permits the board to be more easily inserted.

The connector shell would require an edge at the end of the spring to hold the spring in a pretensioned position



2. Subject: Spring length.

The reason for a longer spring is that it does not relax as easily as the short one. (Stress relaxation is caused by aging under tension.) The longer spring exerts a relatively constant pressure over a period of years.

3. Oxidation and spring pressure:

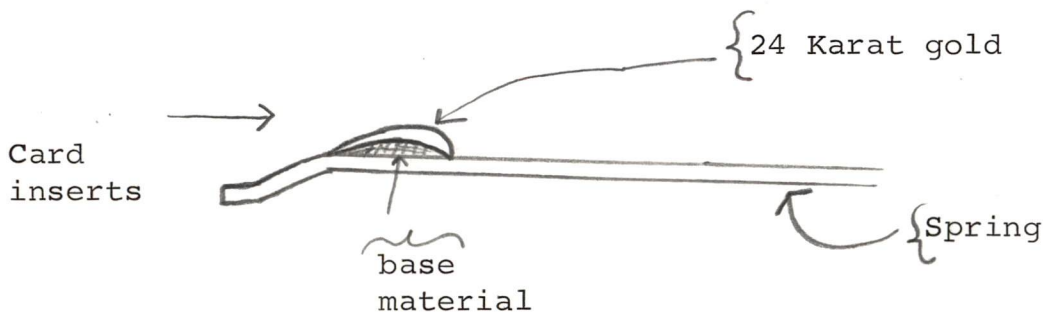
The oxidizing surface (tarnish film) is hard and brittle but it is not tightly bonded to the metal. It can be found on both the contact and the board. Once it is cracked or fractured (by sliding and pressure of contact) it is easily removed (sliding and plowing action). (Both sliding and pressure are required to fracture the oxide film.) When a card is pulled out, (after a couple of years) the oxidize surface will be fractured. The resultant broken fragments will be floating around in the contact area. When the board is re-inserted; a force great enough to plow the debris out of the way, must be available. When the board goes back a little bit deeper, the contact must break away new oxidizes to make good contact. John suggests that failures may occur (five insertions) after a couple of months under high himidity conditions.

4. Solid Gold button

The reason for the solid gold button is that it is cheaper than electroplating a low porosity gold surface. Solid gold is dense (not very porous) and thus, corrosion does not occur as rapidly as it would if the surface was porous.

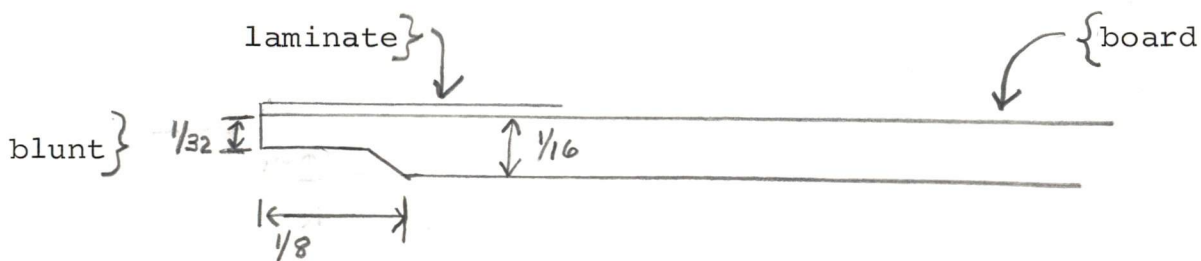
The button should be made of 24 Karat gold bonded to a base material (80% copper, 20% nickel). It should be rolled in a half tear drop shape (cross section). The gold should be about .003 thick. The base is resistance-welded to the phosphor bronze spring. A reaction would occur if the gold was applied directly to the phosphor bronze spring.

A company, named Handy and Harmon, can make the button wire and supply it on a roll.



5. Beveling the end of the board

A suggested method of beveling the board is shown



6. Board warpage and loose fibers

John noticed some warpage in our boards. He suggested that the board be stamped out so that the grain or weave of the fiber cloth is parallel to the shortest dimension. (2½ inch side on FLIP CHIP.) Warpage is perpendicular to the grain.

There is a manufacturer of modules that are 4" X 8" X 3/32 that requires no support bracket to prevent warpage.

If the edge of the board is examined under a microscope a number of long fibers can be seen. The fibers break off and contaminate the connector (poor contact).

A better stamping tool or method of stamping might resolve the problem. Cutting on the bias (diagonally) eliminates the fibers but contributes to warpage problem and also tends to be wasteful of board material.

7. Connector Design

The connector should be made of 2 pieces.

1. The springs should be molded into a block. The springs should leave the block at the same relative point. (The springs in our connector leave the connector at two different points. This means that although they start out with the same tension; in a few years they will have different tensions due to the fact that the stress relaxation curve is different for differently formed springs.) The blocks should have locating or reference points on them.
2. The shell of the connector should be the second piece. It should also have locating points.
3. The reference points on both pieces permit easy assembly.
4. The connector may be revisited together.
5. A two-piece connector is usually much simpler and cheaper to make because the mold does not have to be so complex.

8. Printed circuit board leakages.

Printed circuit conductors are generally closely spaced. A small amount of moisture (high humidity) can cause leakage. John suggested that the wiring side of the board (except gold contacts) be sprayed with thermo plastic acquallic lacquer after the components have been soldered. This will prevent leakage and corrosion due to fingerprints. The plastic evaporates when heated (board repaired).

9. Connector Reliability

The weakest link in a system tends the connector (possibly 1/10

as reliable as all the other components). The telephone company, until recently, made all connections by hard wire due to the poor reliability of connectors. The systems must last many years due to the large investment in them. They must be reliable over the entire span.

There are six to seven thousand contacts in a PDP-8. This is the largest number of any one item in the computer, and yet, it tends to be the least reliable. It is more susceptible to failure due large numbers and reliability. The smaller cards tend to compound this; less logic on small cards, more cards must be used, the more used requires more contacts which means earlier failures.

The quality control of the connector and the wire wrap are an extremely important part of the system.

The general connector specifications that have been presented would result in a connector much better than any commercial grade available. John suggests that if we write specifications, based on this information, that we keep it proprietary. We can have one of the best connectors on the market. In a number of years, when other manufactures are having difficulties due to connector failure, we will be in the lead with good reliability. There will be no costly venture before or after connector manufacture.

John mentioned that one of the reasons that CCC has had such good luck with NASA, is their reputation for reliability. He estimates that about 20% of CCC's module production goes to NASA (sold on a sole-source bid).

John feels that he could do a detailed connector design in a few days (dimensions, drawings). He would also talk to the connector manufacturer. After the connector manufacturer evaluated the proposal; a couple more days would be required on John's part. In general, he said that he could consult for us for about 5 days of his time and come up with a very reliable connector. I think that we should investigate this possibility.

In relation to the contract; John is going to submit his proposal to the prime contractor about the end of January. We should be contacted by a number of people from the prime contractor about March 1.

The first system should be delivered about June 1. The overall system will take about two months to install and another month to be accepted. The rest of the systems will then be ordered. The second system will be due about 6 months after the delivery of the first system. The rest will be delivered in about 1 or 2 months' intervals.



INTEROFFICE MEMORANDUM

DATE December 7, 1964

SUBJECT PERSONS TO AUTHORIZE VISITORS AFTER REGULAR WORKING HOURS

TO Ken Olsen

FROM Loren Prentice

At the last meeting of the Security Committee, it was agreed that we need a new method of allowing people to authorize visitors. In the past, Bob Lassen or myself authorized these people to come in, often times over the telephone without really knowing whether these people, or their sponsors, were responsible or not.

The committee agreed that the cost center managers would make a list of people who are authorized to authorize and/or accompany other visitors after hours.

As you expressed some concern about this at the time of your last visitation to IBM, I am asking you to prepare a short paragraph or two expressing your views on the responsibilities of such persons and that this be included in their notification that they are now authorized to bring in visitors after hours.

Loren B. Prentice
Plant Security

2 copies



INTEROFFICE MEMORANDUM

DATE 4 December 1964

SUBJECT FLIP CHIP connectors

TO K. Olsen FROM D. Smith

Mr. John Hitch of Hitch Associates, called last night. Mr. Hitch is interested in proposing that a number of our PDP-8 computers (approximately forty two) be used in a large switching center. One of the criterias of the job is reliability and this is one of the reasons we were chosen.

About three (3) weeks ago, John was here and I gave him a FLIP CHIP connector block and a couple of etched FLIP CHIP boards, one of which had the gold plating on the contacts. The connector had our name placed on it so it was somewhat to our specifications although, I am not sure exactly how well it met them. I obtained the connector from Ron Wilson. The reliability of the connector is worth considering because a large number are used in the systems. John is also planning to use our modules for special circuits. He ran an evaluation on the connector and feels that he needs a somewhat more reliable one for his particular application. John has had quite a bit of experience with connectors and came up with some very good suggestions that we might consider using as a basic standard for evaluation:

1. An average of 250 grams of contact pressure (with a minimum of 160 and a maximum of 310 grams).
2. The plating on the board be 3/4 of one per cent cobalt gold alloy about .001 inch thick with a knoop hardness of about 160.
3. The base metal of the gold button on the contact should be about 80% copper and about 20% nickle.
4. Spring material be made of grade A phosphor bronze.
5. That a lubricant should be used.

The above criteria will permit about 500 insertions for the connector, about 200 insertions for the card, without fail. Actually, one could expect 2000 insertions for the connector and 800 insertions for the card, under the above conditions. This would be designed to last about 40 years, with good reliability.

The criteria which controls all the other items is the contact pressure. It has to be great enough to overcome the impurities that are on the card and the contacts. The impurities are gold oxidation, pieces of board material dust, and other dust impurities in the surrounding area. When the card is inserted, gold particles tend to come off and these small particles oxidize. The oxidized particles then are a form of a resistance. In some tests the card is inserted many times during a short period of time; however, this does not permit the gold to oxidize, even though some is rubbed off upon its insertion. Inserting a card once every two years, over a period of years, would allow the oxidized gold to get under the contact and tend to cause poor contact.

The spring pressure should be somewhat constant. The contact should be molded in the block because wiring on the back side of the connector, tends to cause different contact pressures. The contact material should be made from a round wire. The stress relaxation pressure is four times better for a round wire than for a rectangular wire. The other end of the round connector can be made square by coining or there is such a thing as a round knurled wire-wrapped connector that is acceptable.

We bevel the board on the etched side. This causes the contact pressure to be applied to the board itself, this action wipes off the insulating material onto the contact. Then pressure is applied to the end of the laminate. The pressure applied on the end tends to remove the laminate by peeling it off. The laminate peeled off on one of the boards John was testing. He suggests that the tip of the board be BLUNT and that the board be beveled on the opposite side of the lamination. A ramp should be built under the contacts on the opposite side of the contacts. When the board is inserted, the lamination should be under the contact before pressure is applied. The board would then come in contact with a ramp which would force the board against the contacts and pressure would be applied.

The lubricant prevents cold welding which would result with the specified contact pressures. John suggested that a good grade of micro crystalline wax should be used as a lubricant. There is a wax called Carvona Wax that is made in Brazil. This wax was diluted in trichloroethylene of about .5% wax by weight. The result is a good lubricant that will not collect dust and that can be sprayed or dipped on the module.

Further points about connectors are as follows:

1. Prevent the circulation of air over the contacts. The dust and oxides tend to collect on the contacts when stirred up. This step alone tends to double

the reliability. Our connector is good in this respect as the contact area is somewhat protected from circulating air.

2. Bifurcated contacts do not improve reliability on connectors. They are for moving contacts such as relays.
3. In order to get the higher contact pressure required the contacts will probably have to be made longer.

In the evaluation of our connector John compiled the following information:

1. Wide variation in contact pressures.
2. The gold button was not on the knee of the spring. The pressure was somewhat on the side of the button. It wore away rapidly and the spring made contact after about 40 insertions.
3. After about 50 insertions all the contacts were contaminated.
4. The edges of our board wears easily. The glass board dust was on the contacts (good insulator).
5. The contact and connector are soft gold.

The circuit that John wishes to put on a double FLIP CHIP board is very dense and requires 37 contacts. He uses two double boards to each connector block.

John suggests that if we redevelop the connector that we have 1 or possibly 2 (19+19) extra contacts designed into the connector in the key area. Our connectors could be made by the manufacture by inserting a blank in place of the two contacts. By removing the blank they could build the type he requires.

He also suggests that possibly we could investigate the possibility of using a connector that only one double board could fit in. The connectors could then be spaced dependent upon the depth required for the components mounted on the boards. Another suggestion was that possibly the board could be guided on the ends instead of using the center.

John feels that he must use a better connector than the type he evaluated.

He suggested that we could possibly get a re-evaluation on our present connector. The connector manufacturer would possibly supply experimental ones at a low cost. He suggested that the most connector manufactures supply the mold without change in order to get the overall business. The mold tends to be prorated over a number of connectors.

John thought perhaps he could discuss the connector design and testing procedures with the person in charge here. He also suggests that information might be useful to our quality control department.

I think that this evaluation of our connectors indicates Mr. Hitch's extreme desire for our products and is an attempt to improve our reliability to a point where he can feel completely free of any qualms in recommending that our equipment be used in his proposal. The evaluation of this connector certainly took quite a bit of effort and time on his behalf.

cc: S. Olsen
C. Kendrick
L. Prentice
P. Backholm



INTEROFFICE MEMORANDUM

SUBJECT Space

DATE December 3, 1964

TO Kenneth Olsen ✓
Dick Mills
Loren Prentice

FROM Dave Packer

My analysis* of space needs shows a clear demand for 26,000 additional square feet by October, 1965. Areas in which space needs exceed that currently available are:

1. Floor 5, Building 5. Caused by expansion of accounting and checkout requirements.
2. Floor 4, Building 5. Caused by expansion of computer assembly requirements.
3. Floor 2, Building 12. Caused by expansion of home and New England sales offices.

Two areas that appear to be coming available are:

1. The rest of Floor 3, Building 5 (about 38,000 sq. ft.) from Bradley.
2. Floor 2, Building 4 (about 13,000 sq. ft.) from Raytheon.

* Based on the Oct. '64-Sept. '65 Cost Center and Personnel Forecasts.

DWP:ncs

D. W. Packer



INTEROFFICE MEMORANDUM

DATE

December 3, 1964

SUBJECT STATUS REPORT ON BTU FURNACES

TO

✓ K. Olsen
L. Prentice
T. Stockebrand
P. Backholm
H. Crouse

FROM

B. Farnham

I visited the BTU plant in Waltham, on Thursday, December 3, to determine the delivery status on our furnaces. While the furnaces are in the very early stages of assembly, BTU has on hand the component parts, and has completed the fabrication of the frame work.

The electrical work has been accomplished on the large furnaces and there is approximately twenty hours of electrical work remaining to be accomplished on the two smaller furnaces. The muffles and brick work are in the process of being assembled. Mr. David Barry, who is responsible for our furnaces, has assured me that the furnaces will be assembled by December 9 or 10, and that we will be able to run acceptance tests on December 11. After acceptance there is approximately a day and a half of skidding and packaging before they can be delivered to Maynard.

In summary, while BTU is about ten days late on their promise of delivery, it does not appear to have been caused by a serious reason, but more from running about two days late in the engineering and production schedules.

After having received three bids on the rigging job, Riverside Transportation Company submitted the lowest bid by \$200.00 and they have been notified to be ready to deliver the furnaces on the 15th of December.

dec **MEMO**

DATE Nov. 25, 1964

TO Ken Olsen FROM Jack Atwood

This is a form which Bob Graham designed on his own initiative to help make sure the many details of future ~~xxxxx~~ shows are properly attended to.

It is particularly noteworthy since Bob's only direct responsibility has been for the shipment of literature and minor display accessories.

It indicates an appreciation of the problem and a desire to help - without waiting to be asked.

*Jack Atwood
info only*

SHOW FACT SHEET

SHOW	10th Annual Conference On Magnetism and Magnetic Materials	
SHOW MANAGER	John L. Whitlock, AC 703-385-5444 (Oakton, Va.)	
ESTIMATED ATTENDANCE	1000	
LOCATION	Radisson Hotel 7th Street between Nicollet & Hennepin Avenues Minneapolis, Minnesota	
DATES	November 16,17,18,19, 1964	
SHOW HOURS	Monday, 16 November -- 9:30 A.M. - 5:30 P.M. Tuesday, 17, November- 9:30 A.M. - 5:30 P.M. Wednesday 18, November- 9:30 A.M. - 5:30 P.M. Thursday, 19 November - 9:30 A.M. - 4:00 P.M.	
BOOTH NUMBER	22 & 23	
BOOTH DEPOSIT	Paid	
BOOTH DETAILS	20 foot booth space. No booth being shipped. Will use standard drapes (gold) provided by show management and walnut DEC header.	
BOOTH PERSONNEL	Patrick Greene Lee Butterworth Paul O'Malley James Hogan	
EXHIBITORS BADGES	None required.	
EQUIPMENT	1- 1525 Memory Tester (core handler to be picked up in Minneapolis) 1- 2117 Core Tester 1- Pulse Generator 3- Oscilloscopes -assorted cables, connections, etc. -sample FLIP CHIP modules & mtng. panel -DEC Walnut Header -Literature (see literature list attached)	

DEMONSTRATION

Type 1525 in continuous operation
Type 2117 Core Tester w/handler

SPECIAL SIGNS - MURALS

2- signs 1- Features of 1525
 1- Features of 2117 (Burroughs)

TELEPHONE

1 private telephone at booth ordered from Mr. Bill Rudin,
at the Radisson Hotel, 11/9.

POWER

3- 2500 watt outlets, 110 VAC ordered from Mr. Bill Rudin by phone,
11/9.

FURNITURE

1- ash stand
1- waste basket
4- contour chairs (fibreglass)

11/9
Ordered by phone from:
Brede Inc.
2211 N.E. Broadway, Minneapolis

carpeting- salt & pepper. 20 ft. x 8 ft. taped on the front and
right side as you face the booth.

LABOR

3- laborers ordered for setup on 15 Nov 64 at 10:00 A.M.
3- laborers ordered for take down on 19 Nov 64 at 4:00 P.M.

ordered from Brede Inc. 11/9 by phone

SET UP

Start- 8:00 A.M. Sunday, November 15, - must be completed by
9:00 A.M. Monday, 16 November.

TAKE DOWN

Start- immediately after close of show on 4:00 P.M. on Thursday,
November 19. Must be completed by 8 A.M. Friday Nov 20.

HOTEL RESERVATIONS

2 Twin rooms at the Radisson Hotel (see address p.1)
(accommodations for 4)
phone- AC-612-333-2181
 s
room/confirmed 11/9 and guaranteed for late arrival

TRAVEL P. O'Malley
 Jim. Hogan Lv. Boston 11:20 A.M. 14 Nov. United Flight 225
 L. Butterworth Arr. Chicago 12:45 P.M.
 Transfer to United Flt. 485 Lving 1:30 P.M. Arr. 2:43PM
 below
 P.Greene (see ~~XXXXXXXXXX~~)

SHIPPING DATE 12 November 64, Thurs. noon BY Emery Air Freight via Palmer

Itinerary-

Pat Greene.

Lv Boston 7:15 P.m. 15 November, American Air Flt. 903
 Arr Chicago and transfer to United Air Flt 497 which
 leaves Chicago at 10 P.M. and arrives in Mpls. 11:23 P.M.

Literature List-

- in green folders* < 500 Memory Tester Brochures 1521
- 500 Memory Tester Bulletins 1525 with 500 half tones
- in red folders* < 500 2118 Pulse Generator Brochures
- 500 2110 Pulse Generator Bulletins with 500 half tones
- in orange folders* < 500 2117 Core Tester Bulletins with 500 half tones
- 500 2116 Core Tester Bulletins with 500 half tones
- 500 2113 Core Tester Bulletins with 500 half tones
- in blue folder* < 500 2217 Memory Exerciser (Flip Chip) Bulletin w/ 500 half tones
- 500 Show reply cards (single card)
- 500 Current Calibrator Bulletins 72
- 500 Current Drivers 58-68 Bulletins
- 250 Flip Chip Folders
- 250 Computer Flyers
- 250 Module Flyers

20 - Press Kits- Should be taken to show press room immediately upon arrival.

RULES AND REGULATIONS FOR EXHIBITING

SPACE ASSIGNMENT

Priority for space assignment is based on the order in which applications are received on a "first come first served" basis with preference given to past exhibitors.

BOOTHS AND SIGNS

The type of booth furnished is of aluminum, with standard columns and aisle posts. The background is 8 ft. high and the side rails are 3 ft. high. A uniformly lettered sign, 44 in. long and 9 in. high, carrying the name and address of the exhibitor, will be furnished free and located on the top of the background. The booth drapery will be gold in color.

FURNITURE, ETC.

Brede, Inc., 2211 Broadway, N.E., Minneapolis 13, Minn., will be the official Conference decorator. Rental order forms for furniture, booth accessories, special decorating, etc., will be forwarded to exhibitors after space assignments have been made.

INSTALLING EXHIBITS

The exhibit area will be available for installing exhibits at 8 AM on Sunday, November 15, and all crates, packing cases, etc., must be off the floor by 9 AM Monday, November 16. Exhibits will close at 4 PM on Thursday, November 19, and tear down will start at once. The area must be cleared by 8 AM Friday, November 20. Freight elevators have a 4500 lb. capacity and are 7'x8'x9' inside dimension. Floor load maximum at hotel is 150 lbs. per sq. ft.

ELECTRICAL INFORMATION

AC current available. 110 volt-60 cycle-single phase; and 208 volt-60 cycle-single or three phase. Outlets may be ordered from Radisson Hotel. Order forms will be forwarded after space assignments have been made. All other electrical work will be charged for by the hotel at rates reflecting necessary labor and materials.

LABOR

Assistance labor for packing and unpacking is available upon request. Order forms will be forwarded after space assignments have been made.

SHIPPING INSTRUCTIONS

All freight charges must be PREPAID. Exhibitors should address shipments as follows:

EXHIBITOR'S NAME—BOOTH NUMBER

Conference on Magnetics
Henry Lambert Trucking Co.
101 1st Ave., N.E.
Minneapolis, Minn.

MAIL AND COMMUNICATIONS pertaining to exhibits should be addressed to:

JOHN L. WHITLOCK ASSOCIATES, Exhibit Managers
253 Waples Mill Rd., Oakton, Va. 22124 — Phone: 703/385-5444

ADMISSION TO EXHIBITS

Exhibits will be open to Conference members at no charge. However, admission to the meetings will require the payment of a registration fee. Technical publicity will be used to encourage the attendance of persons with specific interests in the items exhibited. Exhibitors' booth personnel are invited to the meetings at no registration fee.

GENERAL

(a) The Conference management reserves the right to determine the eligibility of any company or product for inclusion in the exhibition.

(b) Exhibits for employment purposes are against the rules.

(c) The use of alcoholic beverages in the exhibition area is prohibited.

Contract: The Application and Contract for Exhibit Space when properly executed by the exhibitor and accepted in writing by the Conference management shall be considered a binding agreement between the two parties, thenceforth to become subject to the rules and regulations included herein.

Cancellations: Cancellations by exhibitors will be accepted only at the discretion of the Conference management based upon the following schedule of penalties: 60 to 90 days prior to opening date of show, 10% of total contract; 30 to 60 days prior, 50% of total contract; less than 30 days prior, 100% of total contract. If exhibit fails to arrive, exhibitor is responsible for total booth rental.

Fire Laws: Minneapolis Fire Laws must be strictly observed. Crowding will be restricted.

Electrical Safety: All wiring in booths or display fixtures must meet Underwriters rules and Fire Department regulations.

Hours: In their own best interests and for security, exhibitors are required to man their booths during all open hours. They may not dismantle before the exhibition closes. Hours may be adjusted by the Conference management if necessary.

Display Heights: Sidewall construction, if used, may taper on a diagonal of from 8 feet at the backwall to 3 feet at the aisle, or extend as a high panel 4 feet out from backwall. These limits are to provide a clear view of the neighboring exhibits. Raw wood or cardboard wings to booths must be covered or painted if they are visible in adjacent booths. The placing of high equipment must conform to these rules.

Management Responsibility: The Conference management will undertake to exercise due care to help and generally protect exhibitors, keep them informed and to attract a good audience to the exhibits.

Liability: The Conference on Magnetism and Magnetic Materials, its management and all organizations and individuals who are employed by it in connection with the Conference will not be responsible and shall be held harmless for damage or loss resulting from fire, theft, or any other cause whatsoever, including accident or injury to exhibitor, their employees, the public and others. The exhibitor agrees to pay the Radisson Hotel for any and all damage to the building or its equipment incurred through carelessness, or otherwise, of exhibitor or his employees.



INTEROFFICE MEMORANDUM

DATE November 25, 1964

SUBJECT Maintenance Manual for Non-Standard Portions of Experimental Display System for Fort Meade

TO K. Olsen
J. Atwood
S. Grover
D. Packer

FROM R. E. Savell

cc. R. Beckman
G. Rice

The price of \$6,000 quoted in our letter of January 31, 1964 to Fort Meade was determined at a meeting between Bob Beckman, George Rice and myself on the morning of January 31, which was the last possible date the quote letter could have been mailed to arrive by the due date of Monday, February 3. It was a figure based on Bob's previous experience with the manual that was written for the Analog to Digital equipment previously supplied to Fort Mead on a different project. None of us have a recollection of whether this figure was intended to make money or not. We do remember that we considered the manual to be about 1/3 to 1/2 the size of the A-D Manual. Neither Jack Atwood nor anyone else in Technical Publications was contacted at that time for a figure due to the lack of time.

Shortly thereafter a request was received by Digital from Fort Meade to completely justify all of the prices listed in the quote letter. At this time Ed Simeone contacted Jack Atwood who made up the attached estimate of the cost of this manual. As you can see he estimated the cost at \$6,244 and his estimate was for 310 hours of writing time. I was not aware that this had been done until last week when I contacted Ed looking for information.

Paul Barber was told at the beginning of the writing portion of the project that the price quoted was \$6,000. The actual cost of the manual, as nearly as it can be determined at present, was obtained from Dave Packer. The actual cost through September with an estimate for October amounted to \$4,900 with a printing cost estimated at \$1,500 for a total of \$6,400. This includes 480 hours of writing time. Both Jack Atwood and Paul Barber felt that the 12 weeks was not an extreme amount of time to have spent on this manual considering what they felt were the large number of changes that were made during the design. I looked over the manual, which contains 70 pages of text and approximately 25 drawing reductions. The drawings were reductions of standard systems drawings and were not drawn especially for the manual. I feel that the text material contained about what it should have contained and did not go into an excessive amount of detail. I doubt that the amount of text material could be reduced by any greater amount than 10%, if that.

Both Jack Atwood and Stu Grover have told me that they do not, however, have any real confidence in the cost figures obtained from Accounting and feel that the \$6,400 figure may or may not be correct.

RES/mro

U. S. Army Electronics Procurement Office
 Fort Meade, Maryland
 Contact #64 LYN/PR 15017

Prepared by J. C. Howard
Do not use.
For information only

Extra Cost Items - Item 1
 Maintenance Manuals for Non-Standard Portions of System

Items 8 & 9

Direct Labor

Technical Writing	190 hrs.	@ \$5.00	\$950
Technical Typing	110 hrs.	@ 2.00	220
Technical Illustration	100 hrs.	@ 3.00	300
Offset Reproduction	80 hrs.	@ 2.50	200
			\$1670

Burden

Technical Publications \$1670 @230% \$3841

Other

Direct Labor

Technical Writing	120 hrs.	@ \$5.00	\$600
Technical Typing	70 hrs.	@ 2.00	140
Technical Illustration	60 hrs.	@ 3.00	180
Offset Reproduction	50 hrs.	@ 2.50	125
			\$1045

Burden

Technical Publications \$1045 @230% \$2403.50

Totals

Direct Labor

Technical Writing	\$1550
Technical Typing	360
Technical Illustration	480
Offset Reproduction	325
	\$2715

Burden

Technical Publications \$2715 @230% \$6244.50



INTEROFFICE MEMORANDUM

DATE November 19, 1964

SUBJECT Reference Your Memo on Inside Versus Outside Module
Commitments

TO K. Olsen

FROM J. Smith

I am not aware of any situation or procedures that would give our module salesmen the impression that inside commitments are given priority over outside customers. It is the exact opposite impression of all other departments in the Company, including Computer Sales. It has always been a major controversy throughout the Company as to why outside commitments should have priority over inside commitments. My personal feeling is that the outside customer should be allowed a higher priority. Outside orders usually generate quick money whereas inside orders are long-term return items. Also it is much easier for us inside to struggle by than for the outside customer to do so.

All manufacturing schedules, priorities and sequence schedules are geared to give the outside customer top priority. Burt and Frank have always been well aware that the first section of the sequence schedule has been devoted exclusively to outside commitments. I cannot understand where our salesmen received this impression.

The procedure for drawing modules for machines is as follows:

Two weeks prior to a machine's expected delivery to Checkout, we draw all modules. During periods when we were asked to expand the output quite rapidly, such as PDP-5, we drew modules as far ahead as three weeks, but this is the exception rather than the rule. You will notice as you walk down the assembly line, that only those machines that are undergoing the very final stages of construction have modules installed. I do not feel that two or three weeks is an excess lead time. But to insure that not even this amount of time will affect outside customer orders, we have told Frank Kalwell to feel free to call us to fill customer orders if he deems it necessary. Frank in the past has taken advantage of this agreement, and we have indeed removed modules from machines.

To: K. Olsen
November 19, 1964
Page Two

I would like to volunteer to discuss the two above problems with whomever you feel necessary to clear up the above two misconceptions.



INTEROFFICE MEMORANDUM

DATE November 19, 1964

SUBJECT Cera Circuit F150, CR330, F56

TO Ken Olsen
Maynard Sandler
Dick Best

FROM Paul McGaunn

Sprague Electric Company continues to cause us anxious moments on our cera circuit requirements.

I have requested the Boston office to make their management aware that the lead time we provide is within the agreed time that they desire to manufacture these devices.

Enclosed is a copy of a Sprague internal memo to the Vice-President from the Boston Office with respect to the above problem.

We shall continue to expedite delivery of these items to insure our production needs are met.

Paul McGaunn

Enclosure

A. Martin

November 13, 1964

J. Driscoll

My letter of February 28,
to Henry Crouse with copies
to H. Brafman, A. Martin,
J. Fitzgerald and N. Welch.

DIGITAL EQUIPMENT CORPORATION

Again we find our deliveries on Metanets* to Digital are lagging behind previous promises to this corporation by Sprague Electric.

During February, if you recall, Al Pastle and yourself met with Ken Olson, President of Digital and indicated a six week delivery would be made against these items. We now have open orders with delivery promises being made for some three months after the date of release, for example:

P. O. 39464 - part F150 - presently 10,000 pieces have been released and the customer requested delivery on October 29. Sprague promises delivery: 4,000 pieces on November 20, and 5,000 pieces on January 28, 1965.

P. O. 39464 - part CR330 - 5,000 pieces were released on October 9, Sprague promises 2,000 pieces on December 4; 1,000 pieces on December 26; 1,000 pieces on January 2, and 1,000 pieces on January 8.

P. O. 38164 - part F56 - customer released 1,000 pieces on September 8. Sprague promised delivery November 6, (we failed to meet delivery) subsequent promise of November 13. An additional 3,000 pieces on this item was released on September 22, Sprague promises delivery November 27.

You will note that we are hardly maintaining our six week promises to Digital. They are a valued customer on many other product lines.

We urge positive action with reference to these orders, otherwise we will find ourselves creating a very poor impression in the eyes of Ken Olson.

J. P. Driscoll

JPD/m

* Registered trademark

CC: H. Brafman
J. Fitzgerald
N. Welch

dec

INTEROFFICE MEMORANDUM

SUBJECT
TO

Some Notes Taken at the
American Management Association Conference No. 8251-03, on
Compensation Abroad for Overseas Employees, November 11 - 13, 1964.

DATE
November 17, 1964

FROM

Ken Olsen
Harlan Anderson
Win Hindle
Stan Olsen
Dick Mills

Jon Fadiman

The first speaker was George F. Dickover of the Industrial Relations Counsellors' Service in New York City, who presented a plan which he recommends to businesses sending personnel overseas. The program refers to Americans sent overseas for two years or more. Compensation follows a balance sheet approach in which the employee is compensated by a premium plus all excess costs that he will incur.

1. First there is the base pay.
2. On top of that there is an overseas premium which is given for the following reasons:
 - a. Separation from home.
 - b. Foreign job usually involves larger responsibility.
 - c. Job involves training of foreign nationals.
 - d. Employee must often work in a foreign language.
 - e. The employee is representing the company more than he would be if in the United States

Suggestion is that this premium should equal 15% of the base pay. In addition, there is an environmental factor for undesirable locations, such that this premium may vary from a minimum of 10% up to 25%.

3. Allowances:
 - a. For shelter, employee will pay more. The company should make up the excess that he will pay over that which he would pay in the U. S. Employee is normally considered to pay 15% of his base pay for shelter in the U. S.

November 17, 1964

Page Two

- b. An additional allowance should be made for cost of living. This is based upon the State Department's local cost of living index, compared with Washington, D. C. This is determined to be an excellent index and almost all companies use it. It should be applied only to the percentage of income spent in the foreign living which normally is between 50 and 60%.
- c. In addition, education for children should be fully reimbursed for the lower school.
- d. In addition, any benefits required by foreign governments should be paid for by the company, if these benefits will not accrue back to the individual.
- e. Policy of full tax equalization should be followed. This means that the company retains and pays out for the employee the same amount of taxes he would pay on his U. S. income as if he were not going overseas. Normally the tax is computed on his base pay only. In a few cases, the premium is also taxed. All the rest of the benefits are thus tax free. Supply of an automobile is considered separately. It is usually at the employee's expense if he is permanently living abroad.

The next speaker was Mr. Knappen of Standard Oil of New Jersey, speaking about compensation for nationals. Unique factors:

1. General inflation rate, which has been recently about 5% of the cost of living per year.
2. Salary levels themselves have been rising and thus there has been an increase of about 6 to 8% per year in real income.
3. Bargaining goes up into the professional levels in Europe. Minimum wage levels etc. are bargained and set at the national level.
4. Many additional bonuses, etc., required by law or customs, such as the Christmas bonus, etc.

Recommendation is neither to categorically ignore these extra factors, nor to follow them explicitly, but in general a compromise

is best which leans on the side of sticking with custom rather than going against it. There is always the problem of equal pay for equal work. The nationals want pay equal to the amount of the American expatriot, and in general they don't get it. Nevertheless, there are some valid reasons for this. It is important not to pay dollar salaries to other than Americans.

First case study was presented by Ralph E. Paddock of Socony Mobil, in which he presented the compensation program for his company for American expatriots, i.e., personnel living abroad for two years or more. Balance sheet method also used.

Base salary plus variable foreign service premium varying from 20 to 30% depending on location. Mr. Paddock believes that for Europe this should go down to 15%. In addition a cost of living allowance is paid based upon the State Department local cost of living index for the city in which the person will be. This cost of living allowance is reduced by a factor of 1/12 because the employee is given one month's vacation back in the United States. It is also adjusted for spendable income only, which is assumed to be about 60% of actual income. In addition there is a housing allowance given of 100% of the differential cost of rent and utilities in the foreign city versus rent and utilities in America. In addition, the policy of tax equalization is followed, such that the amount of taxes withheld by the company is what the employee would pay in U. S. income taxes based upon his normal deductions and an additional straight 10% deduction. He is reimbursed for all foreign income taxes. In addition there is an educational assistance allowance paid for everything in excess of \$10 per month per child.

The next case study was presented by Mr. R. L. Schmidt for General Electric. Mr. Schmidt discussed some of the fears that an American employee has when he is sent abroad. Most important is his fear of detachment from the parent company. Second, comes his fear of unfamiliar environment. Third, comes his fear of how he will educate his children, and fourth come economic worries caused by the unfamiliar. GE has developed a new plan for GE employees abroad, based upon the following philosophy:

1. The employee is retained on a U. S. exempt salary structure with all normal benefits continued.
2. He is paid a premium for foreign service.

3. For employees on a foreign assignment the philosophy is that he is to be kept "economically whole" with respect to his U. S. counterpart. This is done in the following way:
 - a. His base salary is computed.
 - b. He is paid a premium of 10% of his base salary.
 - c. He is paid an economic adjustment which consists of:
 - 1) A housing allowance,
 - 2) A cost of living allowance,
 - 3) An income tax differential,
 - 4) A 10% additional unitemized expense factor.

The lowest premium paid is 5%, never 0, and in addition to this there is a 10% unitemized expense factor, which comes out to a minimum premium of 15%. Often the expatriot American is given his payment in local currency equal to the amount which a national would receive and the additional is paid back home. Vacation schedules are four weeks per year and every two years the employee is allowed to come home with his way paid for himself and his family. Four weeks' vacation is given overseas in spite of the fact that the company grants only two weeks in the United States for employees with under ten years of service.

Case study number 3 by H. F. Scharges, Chase Manhattan Bank. There is always a problem of education. Careful explanation must be given to the employee so that he understands what his benefits are and that he is not losing by going overseas and there is also the problem of education of top management so that they understand the difficult problems of overseas compensation, and the fact that the additions are necessary.

Allowances are as follows:

1. Base salary, plus an overseas premium. There should always be an overseas premium. Mr. Scharges believes there should be one premium not based on hardship of the area. The reason for this premium are as follows:

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- a. There is a break in the person's cultural ties with home.
 - b. Great mobility of the employee is expected.
 - c. There are always difficulties in adjustment to a new environment. A 15% premium allowance everywhere is what Chase Manhattan Bank gives.
2. Cost of living allowance. Use the State Department local index and apply it to the spendable income only. This is normally considered by the bank to be 75% of the base salary for married people or 56% of the base salary for single persons.
 3. Housing allowance, based upon the difference in housing costs for the employee overseas and in America.
 4. Additional hardship or area allowance. This may be 0 to 25% of the base salary, depending on the hardship of the area in which the employee is sent.
 5. Tax equalization is the best system. Company withholds income tax equal to the U. S. income tax that would be paid by the employee on his base salary counting the dependents and straight 10% deduction. Only Federal taxes are withheld, not state taxes.
 6. Vacations: 4 weeks per year.
 7. Education: Company pays up to \$500 per child for local school.
 8. Additional \$500 is given to the employee as preparation allowance for going overseas the first time.
 9. All reasonable household goods shipped at company expense.

Other comments: Language training is paid for by the company for private lessons for the employee and his wife. Bank wishes to have employee know two foreign languages.

Temporary assignments: Not too much mention was made of temporary assignment. However, the plans of Socony Mobil, General Electric, and Chase Manhattan

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Bank were all approximately the same, as follows: For travel of up to six months the company does not pay for the wife or family to go abroad but allows one trip back home if the employee is away for more than three months. If the employee is away for a period of from six months to two years, the wife and family are sent abroad at company expense. In all ways they are treated exactly like foreign expatriots, as mentioned in the previous plans, with all benefits, cost of living allowances, premiums, etc. The only difference is that the company will subsidize completely the cost of housing overseas because the employee is assumed on this temporary assignment to still have his housing costs at home. The temporary employee away from six months to two years is completely protected for U. S. income tax as for permanent employees, so he does not pay any additional taxes.

The next speaker was Mr. Hutscheson, an economist with IBM World Trade. He listed some of the economic and social trends in Western Europe.

1. Persistent shortage of labor.
2. Tremendous competition for trained personnel.
3. Educational system not designed for economic growth, but instead for the development of an elite group.
4. Inadequate facilities for education.
5. Social structure of state paid benefits.
6. In France many new universities which are trying to de-centralize out of Paris.
7. General influx of American know-how in industry, etc., into the United Kingdom.
8. European managers are well trained in technology, philosophy, and culture.
9. Spain has in general failed to adapt to the modern age but is now becoming awake. Interested in plant modernization, etc. Computers are being applied to Government planning.

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Final speaker was Mr. Walter Rothschild of Cleary, Gottlieb, and Stein.
Subject: Taxation questions for American expatriots.

Salaries: Income from services outside the United States, not subject to U. S. income tax if the employee is either

- a) A bona fide resident of a foreign country for over one year or,
- b) A resident in a foreign country for 17 out of 18 months including one calendar year.

In these cases, the employee may exclude the first \$20,000 of his foreign income. All company benefits, even those not paid in cash are subject to taxation by U. S. Government. Only moving expenses are not taxable. There is a foreign tax credit on an employee's U. S. income tax for all foreign taxes which he has paid which is complete, except that it can be no larger than that required to offset the U. S. tax on foreign income. If a man is overseas on April 15th, he is automatically allowed an income tax extension until June 15th, but must pay the one month interest. A book is available known as "Tax Guide for U. S. Citizens abroad" from the Department of Internal Revenue.

Social Security Coverage: When working for a foreign employer the employee is not subject to social security. The parent company can, however, enter into a contract with the Government to extend its social security benefits to all U. S. citizens working for its subsidiaries.

As for pensions and profit sharing, it is legal for the U. S. parent company to include all its U. S. citizens working for its foreign subsidiaries. With respect to welfare benefits, an insurance company may cover foreign employees if there are not too many. With respect to qualified stock options, the rule is that they must include foreign employees if the U. S. employees of foreign subsidiaries are considered.

In addition, I have the following printed material which you can get from me if interested:

1. Compensation Plan for American Foreign Residents by Socony Mobil Oil Company, a printed booklet stating their plan, effective January 1, 1964.
2. General Electric Program for Compensating Foreign Service Employees, a mimeographed outline of this plan as presented at the AMA Seminar.

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3. A mimeographed survey on foreign compensation dated March 6, 1964 in which 47 companies were asked a total of 38 questions concerning their foreign plans. Answers are given without mentioning which companies do what.
4. An article by Spencer J. Hayden, President of the Spencer Hayden Company of New York entitled "Overseas Operations: Their Personnel Implications."
5. An article by Mark Priceman, manager Education Programs, IBM World Trade Corporation, entitled "Practical Advice for the Overseas Personnel Man."
6. A list of names and company affiliations of the 30 participants in the conference.

JF:nlz

K H Olsen



INTEROFFICE MEMORANDUM

DATE November 12, 1964

SUBJECT Programs Submitted by Engineering Programming

TO K H Olsen
J Shields
R Beckman
G Bell
E Harwood
H Anders on

FROM L M Hantman

Since few lists presently exist concerning the availability of programs produced by the Engineering Programming Group (and incidentally to celebrate the first anniversary of the group's existence) the following list is being published. It includes only those items completed during the past year by members of the group.

*Documentation not yet printed. Information can be gained from the program directly.

** Documentation is in the library and can be obtained from Joan Cowles or Norm Hirst (for PDP-6), but is presently not numbered.

PDP-1

DEC - 1 - 139 - M	PDP-1D-45, CHAR, Flag Test, Chg Flg - 45
DEC - 1 - 146 - M	Mag Tape 131/510C
DEC - 1 - 147 - M	Mag Tape 131/510D Transport Statistics
DEC - 1 - 142 - M	PDP-1 Multiplexer (139) Interface Test
DEC - 1 - 149 - M	630 System Data Test
DEC - 1 - 135 - M	Extended Memory Control Test
DEC - 1 - 136 - M	Extended Memory Address Test
DEC - 1 - 148 - M	Lots of Little Pictures (340 Test)
*	57A Compiler
*	57A Test
*	340 Test
*	BBN Drum

PDP-4

*	AP Automatic Program Priority Interrupt
DEC - 4 - 42 - M	630 System Data Test
DEC - 4 - 44 - M	340 Display Diagnostic
DEC - 4 - 53 - U	Generalized Sort
DEC - 4 - 29 - IO	Microtrieve
DEC - 4 - 54 - M	Extend Memory Control Test
DEC - 4 - 56 - U	Internal Repetitive Merge Subroutine
DEC - 4 - 55 - U	Internal Variable Length Sort Subroutine (Shell Sort)
DEC - 4 - 46 - M	AD 138, 142 Test
DEC - 4 - 45 - M	370 Light Pen Diagnostic
DEC - 4 - 57 - M	57A Tape Error Specification Test
DEC - 4 - 40 - U	57A Subroutines
DEC - 4 - 30 - M	57A Compiler
DEC - 4 - 51 - P	Wire List Program
*	Revised Faster and Shorter CAL Handler
*	Program to remove Comments and Spaces from PDP-5 Tapes
Digital 4 - 46 - IO	PDP-4 MICROTOG
Digital 4 - 45 - IO	PDP-4 DECtape Subroutines
Digital 4 - 44 - M	Extended Memory Checkerboard
Digital 4 - 35 - M	Extended Address Test
Sales Brochure	DECtape: Its Features and Applications
Sales Brochure	Graphpad and other Display Demos
*	Bus-Pak
DEC - 4 - 52 - M	LLP-4 (340 Display Adjustments)
*	Calcomp Plotter
DEC - 4 - 20 - U	Tape Control 54

PDP-5

DEC - 5 - 5 - S	Octal Debugging Tape
DEC - 5 - 40 - M	High Speed Reader Test, Type 570
DEC - 5 - 38 - M	PDP-5 Read Alpha Test
DEC - 5 - 50 - M	Memory Extend Test
DEC - 5 - 52 - M	Teletype 634S Test (Full Duplex)
DEC - 5 - 48 - M	Type 34B Display Test
*	Microtog
*	Simple Tape (580) Test
DEC - 5 - 3 - O	Teletype Output Package
DEC - 5 - 8 - U	Octal Dump on Teletype
DEC - 5 - 41 - U	Octal Dump under Program Control
*	DECtape Subroutines
*	250 Drum
*	Multiply and Divide Test
*	Calcomp Plotter
DEC - 5 - 23 - I	Binary Format Loader for 750
DEC - 5 - 29 - I	Rim Loader for 750
DEC - 5 - 22 - I	Binary Loader for TT33
*	Binary Format Loader - Macro 5 Compatible
*	Binary Format Loader - Macro 5 Compatible, Extended Memory
DEC - 5 - 27 - O	Rim Punch

PDP-6

Maindec 611	Read Alphanumeric Test Program
Maindec 612	PDP-6 Punch Test
Maindec 614	Teleprinter Test
Maindec 602	Micro Checkerboard
Maindec 623	Protect and Relocate Test
Maindec 664	Line Printer Diagnostic
Maindec 610	Read Binary Test Program
Maindec 622	4 x 4K Low End Checkerboard
**	4 x 4K High End Checkerboard
Maindec 622 - 2	16 x 16K Checkerboard
Maindec 613	Core Data Test
Maindec 603-2	16K High End Address Test
*	16K Low End Address Test
Maindec 662	Accumulator Test
Maindec 634 - 2	Lots of Little Pictures on the 6 (LLP6)
*	516 Cursory Operation Code Test
*	516 Data Test
*	630 Data Control (Half Duplex)
*	ASCIAD -- add 2 5 digit ASCII numbers
Maindec 601	Instruction Test (5 parts)
Maindec 641	Card Reader Test
*	Memory Power On-Off Test

LINC

**

Memory Test

**

Instruction Test

LMH:ASJ



INTEROFFICE MEMORANDUM

DATE November 10, 1964

SUBJECT

TO	✓ K. E. Olsen	D. Adams	FROM	H. Crouse
	H. Anderson	W. Newell		A. Hall
	S. Olsen	D. Dubay		
	N. Mazzaresse	J. Craig		
	R. Wilson	F. Eagan		
	E. De Castro	J. Hagerty		
	D. Smith	H. Godfrey		
	R. Savell	S. Maminski		
	D. Kuyamjian	P. Gadaire		
	J. Smith	J. Shields		
	M. Sandler	T. Johnson		

Attached are two memos describing the various aspects of a trip to the Teletype Corporation in Skokie, Ill. on November 4 and 5 by Henry Crouse and Arthur Hall.

Subject: Trip to Teletype Corporation November 4 and 5, 1964

As general information concerning the trip can be noted in a memo by Henry Crouse, this report will cover the technical aspects of the visit.

So that we could discuss some of the mechanical difficulties with #33's, Mr. Niel Bledsoe of the Quality Assurance Department was summoned to the meeting.

Mr. Bledsoe is one of about 5 persons responsible for investigations of field troubles with Teletype equipment. His specialty is Type 33 Teleprinters. He was, I understand, responsible for setting up the production line for #33's. He was very knowledgeable about the equipment and could not have been more helpful. Mr. Bledsoe gave us a tour of the #33 assembly line.

Assembly of #33's is done on a conveyer-type assembly line, mostly by women. Virtually all the flat metal parts are stamped and processed in the plant. Plastic parts and the basic die casting are made outside. Assembly starts with the die casting which has had some machining and threading. Sub-assemblies which have been built up on small sub-assembly lines at right angles to the main line are installed on the main casting. Some adjustment but no testing is done on both sub-assemblies and the main assembly as they move down the line.

Pay is by salary plus bonus per piece produced over a set number of pieces. The work pace is brisk and there is little talk between assemblers. Most people do only one job, but because some jobs take longer than others bottlenecks tend to develop. Higher-paid assemblers who can do any one of the jobs move from station to station relieving the bottlenecks.

Parts are brought to each station by people who shuttle between stock areas and the line. Because a delay might jeopardize their bonus the assemblers are prompt in notifying the stockers when they run low on parts.

Completed assemblies minus their covers are placed in test stands and run to print standard patterns generated by tape readers. All units are "run in" and adjusted if needed after the burrs have worn off.

Completed units are put on a conveyer line which goes to a packing room and thence to storage. I could find nothing which would indicate that any selection of good or inferior units was being made for the benefit of Mother Bell or to the detriment of other customers.

Mr. Bledsoe was well aware of many of the troubles we were having with our Teleprinters. The Teletype research department has been looking into improvements to the reader sprocket wheel which has been a major source of trouble. We should have some new parts to try later this week.

Teleprinters with Serial Numbers lower than 19090 are of the early "series" and are likely to cause more trouble than the others (a prediction not particularly justified by our experience). Mod. kits are available at no cost to make the old series more like the current series.

Platen knobs are being re-designed so that they won't break so easily.

Modifications are underway which will make use of the yellow shipping locks unnecessary on future teleprinters.

The most important discovery of the day was that the 2 hour daily use restriction is no longer felt to have any validity. The unit may be run continuously (except for maintenance periods) for the life of the unit (4500 hours).

In order that we may look into our #33 difficulties in considerable detail, Mr. Bledsoe will be at DEC Thursday and Friday, November 12 and 13. Mr. Bledsoe and I will meet with all the Field Service and IO Checkout personnel concerned with #33's and with any one else who would like to talk with him.

Mr. Bledsoe is interested in hearing about troubles which happen more than 3-4 times. He would like to know the serial number (s) of the Teleprinter(s) involved, the part number of the part out of adjustment or faulty and a general description of the trouble.

Trouble reports (concerning the #33) will reach Mr. Bledsoe if addressed to:

Mr. Clarence Steichman
Department 9016
Teletype Corporation
5555 Touhy Avenue
Skokie, Illinois

Mr. Bledsoe's telephone number is:

312-CO 7-6700 Extension 6416

AH/mro

Subject: Teletype Corporation

Arthur Hall and I visited Teletype Corporation on November 4, 1964.
We visited with:

Mr. Dave Corkle, Sales Manager
Mr. Carl F. Fischer, Supervisor of Sales Contract Section
Mr. Thomas A. Race, Sales Contract Representative
Mrs. Pauline Mazzio, Sales Contract Section
Mr. Neil Bledsoe, Quality Assurance of Field Products.

The topics of discussion were:

DELIVERY: The lead time for type 33's is now four to five months, which Mr. Corkle expects to be a constant for the next 12 month period, with no predictions beyond that. We pointed out that this lead time is a major restriction to our potential computer sales, since our delivery time will be less than four weeks for a PDP-8. We ordered 1000 33 ASR's with delivery to begin next June and continue over a 24 month period. Mr. Corkle explained that Teletype was awarded a large government contract, which saturated their production facilities. They have hired over 1000 people in the past six months. He expects that our order would guarantee delivery, but probably not reduce lead time.

MOTORS: The fifty cycle motors Teletype has been evaluating are planned for release to production in three to four months and delivery to customers in eight months.

PLATENS: The sprocket feed platens for 33's are in their acceptance test phase; they will be in production shortly. No final date has been set for customer availability.

ELAPSE TIME INDICATOR: The modification kit for an elapse time indicator is \$12.20 and I purchased 100 units the day of our visit and will issue an order against it at \$12.20. The modification kit number is 182044. The modification kits are available without putting in the call in a subset.

COMPETITION: SDS visited Teletype the day after us, so I trust all our inputs will be effective before theirs.

Henry J. Crouse



INTEROFFICE MEMORANDUM

DATE November 9, 1964

SUBJECT LINC Computer Status Report

TO *Ken Olsen*

FROM Mort Ruderman
Bill Vaillancourt

Linc #1 American Cyanamid (New York) EN 20483

1. Intermediate inspection completed and accepted.
2. Central Processor checked out.
3. Display checked out.
4. A/D and D/A checked out.
5. Data terminal box to be checked 11/9/64.
6. Margins and heat test 11/10/64.
7. Final inspection 11/11/64.
8. Acceptance cannot be held until Linctape is available.

Items not available from production for this system presently are:

1. Linctape (Flow Corporation)
2. Front panels for remote modules (paint, switches)
3. Data terminal box (Flow Corporation)

Delivery Date - 11/16/64

Linc #2 Denmark - Sales demonstration

Shipped 11/6/64

Linc #3 University of Pittsburgh EN 20546

1. Main frame assembly completed.
2. Started checkout 11/4/64.
3. Central Processor checked 11/11/64.
4. Intermediate inspection 11/12/64.

Items not available from production presently are:

1. Console front panel
2. Linctape (Flow Corporation)
3. Data frame (Flow Corporation)
4. A.C. control cable (Flow Corporation)
5. Display (Eng. Model Lab.)

Delivery date - 11/24/64

Linc #4 Worcester Foundation for Experimental Biology EN 20485

1. Main frame assembly complete.
2. Currently in light-board checkout.
3. Intermediate inspection to be held 11/12/64.

Items not presently available from production are:

1. All cables (Flow)
2. Display (Eng. Model Lab.)
3. Linctape (Flow)
4. Data frame (Flow)
5. Console

Deliver to Worcester personnel 11/12/64

Linc #5 University of Pennsylvania EN 20495

1. Presently in production.
2. Main frame to be assembled 11/10/64.
3. Intermediate inspection 11/11/64.
4. Delivered to checkout 11/12/64.

Items not available presently:

1. Cables
2. Linctape
3. Console
4. Scope
5. Data frame

Delivery date 11/23/64

Linc #6 Washington University EN 20578

1. Main frame assembled 11/13/64.
2. Intermediate inspection 11/16/64.
3. Deliver to checkout 11/17/64.

There are no materials available for this system presently.

Linc #7 Stanford University

Completely delivered to checkout 12/7/64.

Linc #8 Stanford University

Completely delivered to checkout 12/14/64.



INTEROFFICE MEMORANDUM

DATE November 6, 1964

SUBJECT UTILIZATION OF AVAILABLE SPACE

TO Ken Olsen

FROM Loren Prentice

These notes are a result of a conversation with Dave Packer on utilization and a projection over the next 12 month period.

Of course we would like to avoid as much as possible, the game of musical chairs we have here every few months where if some persons move everyone else has to move along with them. Considerations were given to:

1. The need to keep the manufacture areas as closely allied as possible and most particularly, good intergration of the manufacturing areas in building #5.

2. That primarily the need for greater area will take place in the check-out and some in the manufacture, particularly in the area needed for the manufacture and check-out of PDP-8 computers.

3. The need to double the space of the home sales office.

One suggestion would be to clear advertising from the 3rd floor of building #12 to the area now occupied by Bob Beckman and down as far as Bob Hughes area. This would give them an area comparable to the area they now have. The major expense item here would be to provide new dark rooms, however, drains are available in the area that was once proposed for toilets on this floor. This would keep the sales force in building #12 and should provide space adequate for at least another 12 months.

We should acquire the lease that Raytheon has on the 3rd floor of building #4 directly underneath the present drafting room and this would be used to house (at the far end, the Walnut Street end) the field service people that now occupy the top floor of building #5 and provide classrooms for the area now occupied by Bob Beckman's group in building #3 plus storage at tailgate level for all of the show booths and other equipment that has to be moved in and out of the building.

Drafting, Mechanical Engineering and Reproduction would be moved to the newer area acquired from Bradley in Building #5, 3rd floor with reproduction being in the middle of the floor or as near as possible to the middle of the floor to serve all the engineering area with the least amount of travel. This 35,000 square foot area would be more than adequate to take care of this increase. A portion of this area could also be turned over to manufacturing of peripheral equipment such as magnetic tapes and displays which would be easy to divorce from our regular manufacturing line and which need not be tied into the computer until final check-out.

This would clear the fourth floor of building #4 so that it could be occupied by accounting, now on the top floor of building #5. This area is already air conditioned and has sufficient office space and floor carrying load for the heavy equipment that is used by accounting. (Their large IBM machines weigh over 2,000 pounds and they are getting another one this month.) The only thought against this would be the noise level which, as far as I can see we do not generate as much noise above this area as they generate in it so I see no real great problem here. This would clear the top floor of building #5 for expansion for the check-out area which I believe by the first of July of August of 1965 will be needed for check-out for the increased number of PDP-6's, PDP-7's and PDP-8's.

On the face, this seems to be the best solution to serve the needs of the company as I know them at this time.

Loren B. Prentice



INTEROFFICE MEMORANDUM

DATE November 4, 1964

SUBJECT ITEMIZED ESTIMATES OF BUILDING IMPROVEMENTS, BUILDING #3,
3rd FLOOR FOR COMPONENT PRODUCTION
TO Ken Olsen FROM Loren Prentice
cc: Bob Hughes
Bob Dill

CARPENTRY

420 feet of partition @ \$6.00/linear foot	\$2,520.00
28 windows @ \$5.00/window	140.00
11 doors @ \$5.57/ea	63.25
11 sets of door hardware @ \$3.75/set	41.25
Labor and material for 2,260 square feet of plastic ceiling	<u>3,390.00</u>
	\$6,154.50

FLOORING

409 square yards of vinyl floor covering 6 feet wide @ \$1.59/square yard	650.31
Plyscore - 115 sheets @ \$3.84/sheet	441.60
50 inside-outside corners, base board molding @ \$0.50/ea	25.00
Base board moldings - 400 feet at \$0.15/foot	60.00
Labor to install flooring, 409 square yards - plyscore and flooring	<u>925.00</u>
	\$2,101.91

AIR CONDITIONING

\$7,000.00

ELECTRICAL

Service entrance, 4th floor, building #3 800 amp service	\$1,200.00
Lighting - removal of the old fixtures and relocation of circuit breakers	100.00
Install 53 new fixtures	900.00
New distribution of power wiring for furnaces disconnect switches for the furnaces	<u>3,000.00</u>
	<u>\$5,200.00</u>
GRAND TOTAL-----	\$20,456.41



INTEROFFICE MEMORANDUM

DATE November 3, 1964

SUBJECT A Comparison of Automatic Wire-Wrap with Automatic
Termi-Point

TO M. Sandler

FROM C. Stein

cc: K. Olsen ←
J. Smith

1. The purpose of this memo is to recommend that DEC make formal the adoption of Wire Wrap as the method used to produce machine wired computer back panels. The reasons for this recommendation are listed below.
2. At the present time, we are making PDP-7 panels at RCA in Cambridge, Ohio. If we were to purchase a Gardner-Denver machine, the cost per wire would be about seven cents. The per wire cost on a rental basis is eight cents. Included in this cost are:
 - A. Inspection of panel for unwrapped wires and hand correction of these errors.
 - B. Machine wrapping of the panel or panels.
 - C. De-bugging of any new card decks to be run.

RCA assisted us in getting into the Wire Wrap business, developed a mounting fixture for us and assisted me in developing the data conversion program.

3. The advantages of Termi-Point lie in the ease of connection removal for the purpose of machine modification. A connection can be removed without disturbing the other connections on that pin. However, there is no facility from which we can rent time on the AMP machine. Some time is available on a machine at AMP in Harrisburgh, Pennsylvania, but only on a temporary basis, while awaiting delivery on a machine.

AMP has no machines in the field. I do not believe that DEC should "field-test" their machinery without guarantees that AMP is not prepared to make.

There is also some doubt that the Termi-Point machine can perform the task desired without a new control device. At the present, the machine can only lay wire in the vertical, horizontal and 45° diagonal channels. Our present panel has vertical and 22.50 channels. I have contacted them on two occasions to discuss this but have received no answers from that at this time.

4. Thus, I feel that the disadvantages inherent in the Termi-Point system far outweigh the advantages of ease in contact removal.



INTEROFFICE MEMORANDUM

DATE November 2, 1964

SUBJECT Investigation into S.A.R.L. for France

TO K. Olsen
H. Anderson
S. Olsen
J. Fadiman

FROM R. Mills

Summary

As shown in Exhibit A the tax savings in incorporating in France as an S.A.R.L. versus branch are quite substantial. Under a branch operation all profits would be subject to U.S. income taxes, whereas an S.A.R.L., if sales were no more than 30% outside of France, would carry no U.S. income taxes until dividends were declared. We also would have a great deal more operating flexibility under French income tax law by being an S.A.R.L. since shipments can be made from the U.S. to customers outside France with a no-tax position in France.

We have established legal and accounting contacts in Paris which should minimize the amount of time that Jon Fadiman will have to spend being involved in the administrative details of opening up.

At a previous discussion several months ago, we thought that a \$10,000 capitalization would be adequate and under the approval of the French exchange this would seem to be acceptable. The exchange approval takes about two months, which would bring it in January, 1965.

November 2, 1964

(Page One)

Savings - S.A.R.L. over Branch

<u>French Taxes</u>	<u>Branch</u>	<u>S.A.R.L.</u>	<u>Savings</u>
Income Tax Base	(1) Profits on all sales from branch in and out of France 50% rate (2) Allocated profit on all sales in France by DEC (US)	(1) Profits on all sales from sub. in and out of France 50% rate	- Sales direct from DEC (US) - save 50% of French profit
Dividend Tax	(1) 24% withholding on 3/4 of <u>net profits</u> after corp. inc. tax	(1) 15% withholding on <u>distributed profits</u> only	- Could save 24% of all profits on basis of no dividends
Organization Tax	(1) None at start (2) Increases in capital of DEC (US) subject to allocation to France - could be substantial	(1) 1.6% of stated capital - similar on increases	+ <u>Additional cost</u> of \$160 to start - assume same rate on increases
TVA (Turnover) Tax	(1) 25% on landed cost	(1) 25% on landed cost	<u>None</u>
Local Tax on Sales	(1) None? Law not clear - requires further study	(1) 2.8% on all commissions for sales in France (2) No tax on sales outside of France	Possible additional cost of 2.8% on commissions. Distributor position not clear.
TPS (Turnover Tax on Services)	(1) Same as S.A.R.L. (2) No charge on services for DEC (US)	(1) 9.29% on service work for French custs. same to us from French cos. <u>Passed on to cust.</u> (2) Same as (1) for services to DEC (US) on <u>commission basis</u> (base property belongs to DEC (US)) <u>Distributor basis</u> <u>No tax - pty. is subs.</u>	<u>None</u> (Distributor basis)

Investigation into S.A.R.L. for France

November 2, 1964

Exhibit A

(Page Two)

French Taxes

Branch

S.A.R.L.

Savings

(3) Not clear - further investigation

(3) Interest pymts. on loans subject. Include in note conditions and sub. could deduct from TVA payable on sub. sales

US Income Tax

(1) 100% of profits subject to US Income Tax

(1) On 70-30 rule no US taxes apply until dividends are declared to DEC (US)